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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/807,187	MITSUI, TADASHI	
	Examiner	Art Unit	
	DAVID P. RASHID	2624	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *17 July 2008*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-26* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-26* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.

4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .

5) ☐ Notice of Informal Patent Application

6) ☐ Other: _____.

DETAILED ACTION

Table of Contents

Amendments

[1] This office action is responsive to Amendment received on July 17, 2008. Claims 1-26 remain pending; claims 21-26 new.

Response to Arguments

[2] Remarks filed July 17, 2008 with respect to claims 1-5, 11-17, and 19 have been respectfully and fully considered, but not found persuasive.

Summary of Remarks regarding Rejection of Claims 1-5, 11-17, and 19

> *Gleason et al* does not make up for the deficiencies of *Takane et al.* because *Gleason et aL* also fails to teach or suggest "scan[ning] the image, using the predetermined edge reference data, to detect edge points of the image and... compar[ing] the predetermined edge reference data to the intensity values of the image at the edge points to generate a plurality of correlation values, each of the correlation values indicating a correlation between the edge reference data and the intensity value of the image at a respective edge point," as recited in claim 1. Accordingly, *Takane et al* and *Gleason et al.,* individually or in combination, fail to teach or suggest all elements of claim 1.
>
> As explained above, the elements of the amended claim are neither taught nor suggested by the cited references. Moreover, there is no teaching in the cited references that would motivate one of ordinary skill in the art to modify the disclosures thereof to achieve the claimed combination. Consequently, no reason has been clearly articulated as to why the claim would have been obvious to one of ordinary skill in view of the prior art and a *prima facie* case of obviousness has not been established for independent claim 1.
>
> Independent claims 7, 11, and 18-20 are not rendered obvious by *Takane et al.* and *Gleason et al.* for reasons substantially similar to those explained above in relation to claim 1. For example, *Takane et al.* and *Gleason et al.* fail to teach or suggest, alone

(Applicant's Remarks at 23-24, July 17, 2008.)

Examiner's Response

Applicant's arguments with respect to claim 1-5, 11-17, and 19 have been considered but are moot in view of the new ground of rejection. *Takane et al.* does disclose a plurality of images of a pattern ("semiconductor sample and. . .bottom surface of a contact hole" at 6:5-15 are patterns being imaged) to be measured (fig. 11, item 1101), such pattern being measured by a measurer (the creator of the "composite image" at fig. 11) to process the selected image (e.g.,

image "g2" in the "COMPOSITE IMAGE" at fig. 11 was selected from one of the images) to measure the pattern ("semiconductor sample and. . .bottom surface of a contact hole" at 6:5-15 are patterns being imaged and measured)

Claim Rejections - 35 U.S.C. § 112

[3] The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

(i) Claims 1-26 recites the limitation "the intensity values" in claim 1, line 9. There is insufficient antecedent basis for this limitation in the claim.

(ii) Claims 1-6 recites "the edge reference data" which lacks insufficient antecedent basis. It is suggested to amend as "the predetermined edge reference data".

Claim Rejections - 35 U.S.C. § 101

[4] In response to Amendments to the Claims received on July 17, 2008, the previous § 101 rejections are withdrawn.

[5] 35 U.S.C. 101 reads as follows:

> Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

Claims 23-26 are rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter.

A judicial exception claim is non-statutory for solely embodying an abstract idea, natural phenomenon, or law of nature. *See* M.P.E.P. § 2106(IV)(C)(2). However, a practical application of a judicial exception claim is a § 101 statutory claim "when it:

(A) 'transforms' an article or physical object to a different state or thing [(*i.e.*, a physical transformation, see below)]; or

(B) otherwise produces a useful, concrete and tangible result, based on the factors discussed below. . . ." *Id.*

§ 101 statutory transformations of intangible articles or physical objects must be physical transformations (*i.e.*, a physical component to the transformation must be involved). *See* M.P.E.P. § 2106(IV)(C)(2) (requiring the element "provides a transformation or reduction of an article to a different state of thing", a "practical application by physical transformation") *and* Interim Guidelines for Examination of Patent Applications for Patent Subject Matter Eligibility, Official Gazette notice, 22 November 2005, Annex (II)(B)(iii); (III). Claims 23-26 are non-statutory for being a judicial exception, an abstract idea.

[6] In addition, while the claims recite a series of steps or acts to be performed, a statutory "process" under 35 U.S.C. 101 must (1) be tied to another statutory category (such as a particular apparatus), or (2) transform underlying subject matter (such as an article or material) to a different state or thing. *See* Clarification of "Processes" under 35 U.S.C. 101, Deputy Commissioner for Patent Examining Policy, John J. Love, May 15, 2008; *available at* http://www.uspto.gov/web/offices/pac/dapp/opla/preognotice/section_101_05_15_2008.pdf.

The instant claims neither transform underlying subject matter nor positively tie to another statutory category that accomplishes the claimed method steps, and therefore do not qualify as a statutory process.

Claim Rejections - 35 U.S.C. § 102

[7] The following is a quotation of the appropriate paragraphs of 35 U.S.C. § 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

[8] **Claims 1-2, 4, 11-12, 14, 17,** and **23** are rejected under 35 U.S.C. § 102(e) as being anticipated by between U.S. Patent No. 6,538,249 (issued Mar. 25, 2003, hereinafter "Takane et al. 'first embodiment' ").

Regarding **claim 1**, while *Takane et al.* "first embodiment" discloses a pattern measuring apparatus ("[first embodiment] fig. 3 is a diagram used to describe focus deviations which are a problem to be solved by the present invention." at 5:58) comprising:

a storing device (fig. 1, item 111) to store a plurality of images of a pattern ("semiconductor sample and. . .bottom surface of a contact hole" at 6:5-15 are patterns being imaged) to be measured (fig. 11, item 1101) and predetermined edge reference data (

$$\mathbf{G}_x = \begin{bmatrix} +1 & 0 & -1 \\ +2 & 0 & -2 \\ +1 & 0 & -1 \end{bmatrix} * \mathbf{A} \quad \text{and} \quad \mathbf{G}_y = \begin{bmatrix} +1 & +2 & +1 \\ 0 & 0 & 0 \\ -1 & -2 & -1 \end{bmatrix} * \mathbf{A}$$

Sobel filter predetermined edge reference data, available at

http://en.wikipedia.org/wiki/Sobel_operator

), the predetermined edge reference data comprising a plurality of pixels (3 x 3 image pixels given above when applied to other image pixels) that have an intensity gradient (the Sobel filter given above contains an intensity gradient),

an external image device (fig. 1, item 104) to capture the images at different focal distances (fig. 11, item 1101 are at difference focal distances);

a processor (fig. 1, item 111) to, for each of the images, (i) scan the image (scanning to image to create item 1102 at fig. 11), using the predetermined edge reference data (*see* above matrices), to detect edge points of the image ("the Sobel filter is used to extract edge information in the image" at 6:64-65) and (ii) compare the predetermined edge reference data (*see* matrices above) to the intensity values of the image at the edge points (fig. 11, item 1101 which will include edge points) to generate a plurality of correlation values (the correlation values being the pixel values of each Sobel filter image item 1102 at fig. 11; e.g., items Sg1 through Sg5), each of the correlation values (e.g., item Sg1 at fig. 11) indicating a correlation between the edge reference data (*see* above matrices) and the intensity value (e.g., item g1 at fig. 11) of the physical image at a respective edge point;

a calculator (fig. 1, item 111) to, for each of the images, calculate a standardized correlation value (e.g., "max(Sg1, Sg2, Sg3, Sg4, Sg5) = <u>Sg2</u>" at fig. 11, emphasis added) based on the correlation values (e.g., items Sg1 through Sg5) of the image, the standardized correlation value (e.g., "max(Sg1, Sg2, Sg3, Sg4, Sg5) = <u>Sg2</u>" at fig. 11, emphasis added) expressing a correlation between the predetermined edge reference data (*see* matrices above) and the detected

edge points (fig. 11, item 1102 is itself detected edge points of item 1101) of the image, wherein each of the standardized correlation values (e.g., "max(Sg1, Sg2, Sg3, Sg4, Sg5) = <u>Sg2</u>" at fig. 11, emphasis added) corresponds to one of the images (e.g., the second image containing g2);

a determinator (fig. 1, item 111) to, for each of the images, determine an in-focus state (e.g., "max(Sg1, Sg2, Sg3, Sg4, Sg5) = Sg2" at fig. 11 determines an in-focus state at image 2) of the image, based on the standardized correlation value (e.g., "max(Sg1, Sg2, Sg3, Sg4, Sg5) = <u>Sg2</u>" at fig. 11, emphasis added) for the image; and

an image selector (fig. 1, item 111) to select one of the images (e.g., image "g2" in the "COMPOSITE IMAGE" at fig. 11 was selected from one of the images) from the plurality of images (fig. 11, item 1101), the determined in-focus state of the selected image matching a preselected in-focus state ("g2" matches "Sg2"; fig. 6, item 603; fig. 7, item 703 wherein the preselected in-focus state is the decider algorithm in "preselecting" which image is the in-focus state),

a measurer (the creator of the "composite image" at fig. 11) to process the selected image (e.g., image "g2" in the "COMPOSITE IMAGE" at fig. 11 was selected from one of the images) to measure the pattern ("semiconductor sample and. . .bottom surface of a contact hole" at 6:5-15 are patterns being imaged and measured).

Regarding **claim 2**, *Takane et al.* "first embodiment" discloses wherein the external imaging device includes an optical system that is capable of adjusting focal position thereof within a range defined by an integer multiple of a predetermined step width from a predetermined initial value ("fig. 2 is a graph showing changes in a focus evaluation value as electron lens conditions are changed;" at 2:66. As shown at fig. 2, the changes in focus (exciting

current of electron lens) are shown from 0 to 20, which are integer multiples of a predetermined step width (unit 1) from a predetermined initial value (unit 0). The electron microscope disclosed can adjust its focal position thereof within this range.), and the plurality of images have been captured at each of a plurality of focal positions calculated by adding integral multiples of the step width to the initial value (Each focus evaluation taken from fig. 2 is from an integer multiple of the unit 1, and these are applied to the current embodiment as follows: "fig. 11 is a schematic diagram showing a composing process according to the present invention. The figure illustrates an example in which pixel values from a Sobel filter are set as in-focus evaluation references." at 6:60.).

Regarding **claim 4**, *Takane et al.* "first embodiment" discloses the pattern measuring apparatus according to claim 1, wherein the image selector (fig. 1, item 111) selects a plurality of the images determined in-focus states of the selected images matching preselected in-focus states (refer to references/arguments in claim 1), and

the pattern measuring apparatus further comprises an image processor (fig. 1, item 111) to perform alignment processing among the selected images and perform image processing to combine the images (refer to references cited in claim 1; "An optical microscope image acquired by magnifying the alignment pattern a few hundreds times is compared with an alignment pattern reference image registered in the memory unit 3015, and correct the stage position coordinates to exactly align the visual field of the optical microscope image with that of the reference image." at 16:50),

the measurer measures the pattern on the basis of the combined pattern images (refer to references/arguments in claim 1).

Regarding **claim 11**, claim 1 recites identical features as in claim 11. Thus, arguments equivalent to those presented above for claim 1 is equally applicable to claim 11.

Regarding **claim 12**, claim 2 recites identical features as in claim 12. Thus, arguments equivalent to those presented above for claim 2 is equally applicable to claim 12.

Regarding **claim 14**, claim 4 recites identical features as in claim 14. Thus, arguments equivalent to those presented above for claim 4 is equally applicable to claim 14.

Regarding **claim 17**, *Takane et al.* "first embodiment" discloses wherein the standardized correlation value (e.g., "max(Sg1, Sg2, Sg3, Sg4, Sg5) = Sg2" at fig. 11, emphasis added) is calculated by using a plurality of sets of predetermined edge reference data (*see* above matrices).

Regarding **claim 23**, *Takane et al.* "first embodiment" discloses a method of measuring a pattern ("semiconductor sample and. . .bottom surface of a contact hole" at 6:5-15 are patterns being imaged) comprising:

producing a pattern edge model (

$$\mathbf{G}_x = \begin{bmatrix} +1 & 0 & -1 \\ +2 & 0 & -2 \\ +1 & 0 & -1 \end{bmatrix} * \mathbf{A} \quad \text{and} \quad \mathbf{G}_y = \begin{bmatrix} +1 & +2 & +1 \\ 0 & 0 & 0 \\ -1 & -2 & -1 \end{bmatrix} * \mathbf{A}$$

Sobel filter pattern edge model, available at http://en.wikipedia.org/wiki/Sobel_operator

in a form of an array of cells (3 x 3 array cell of image pixels given above when applied to other image pixels), the array having a relative intensity value (the Sobel filter given above contains relative intensity values) stored therein and a position (pixels on images item 1101 at fig. 11 have image positions assigned thereon) of an edge point (an edge point existing on images item 1101 at fig. 11) of the pattern edge model (*see* above image) being assigned thereto;

capturing a plurality of images (fig. 11, item 1101) of a pattern ("semiconductor sample and. . .bottom surface of a contact hole" at 6:5-15 are patterns being imaged) to be measured with the use of an imaging device (fig. 1, item 104) at different focal distances (fig. 11, item 1101 are at difference focal distances);

detecting edge points of each of the images by scanning the image using the pattern edge model (refer to references/argument for claim 1);

comparing, for each of the images, the pattern edge model to the intensity values of the image at the edge points to generate a plurality of correlation values, each of the correlation values indicating a correlation between the pattern edge model and the intensity value of the image at a respective edge point refer to references/argument for claim 1);

calculating, for each of the images, a standardized correlation value based on the correlation values of the image, the standardized correlation value expressing a correlation between the pattern edge model and the detected edge points of the image, wherein each of the standardized correlation values corresponds to one of the images refer to references/argument for claim 1);

determining, for each of the images, an in-focus state of the image, based on the standardized correlation value for the image refer to references/argument for claim 1);

selecting one of the images from the plurality of images, the determined in-focus state of the selected image matching a preselected in-focus state refer to references/argument for claim 1); and

processing the selected image to measure the pattern refer to references/argument for claim 1).

Claim Rejections - 35 U.S.C. § 103

[9] The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

[10] **Claims 5** and **15** are rejected under 35 U.S.C. 103(a) as being unpatentable over the combination between *Takane et al.* "first embodiment" in view of U.S. Patent No. 6,456,899 (issued Sep. 24, 2002, hereinafter "Gleason et al.").

Regarding **claim 5**, while *Takane et al.* "first embodiment" discloses the pattern measuring apparatus according to claim 1, the *Takane et al.* "first embodiment" does not teach wherein only edge points that have been detected in previously scanned images and that are within a predetermined range are scanned with the predetermined edge reference data.

Gleason et al. discloses a context-based automated defect classification system using multiple morphological masks ("It is an object of the invention to provide an automated semiconductor wafer defect classification system that classifies defects based on a combination of their location with respect to process layers of the semiconductor wafer and the defect characteristics." at 1:45) that teaches wherein only edge points that have been detected in previously scanned images ("Next, in the layer feature selector 17, columns of features from the table 19 are selected using information stored in the knowledge database 23. The stored information is information that had been previously generated in an off-line training and analysis procedure. The layer feature selector 17 then performs statistical analysis on the training features, and each feature is ranked based on its ability to discriminate between possible classes.

The information in the database 23 is considered a recipe generated for a specific set of operating conditions, e.g., wafer size, processing step, geometry. The new list of features 20 that is generated from this selection is a subset, or possibly all, of the original features 19." at 6:25.) and that are within a predetermined range ("fig. 3 shows the background layer segmenter 13 in more detail. It includes a difference-of-Gaussians edge detector 47 which carries out edge extraction using a difference-of-Gaussians method; an excess colorspace converter 48 which transforms the intensity values of the reference image; and a continuous region labeler 49 which segments the regions based on edge boundaries, image intensity measurements, adaptive thresholding, and finally a morphological closing process that results in the segmented reference image 14." at :wherein the edge detector uses a threshold (predetermined range) to create layers that are then considered for the knowledge database 23 to be compared with later if accepted into the knowledge database 23.) are scanned with predetermined edge reference data (Scanning for the data already in the knowledge database 23 and the image data currently being compared is considered scanning "with" each other.).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate into the pattern measuring apparatus of *Takane et al.* "first embodiment" wherein only edge points that have been detected in previously scanned images so for creating and that are within a predetermined range are scanned with predetermined edge reference data as taught by *Gleason et al.* "to provide an automated semiconductor wafer defect classification system that classifies defects based on a combination of their location with respect to process layers of the semiconductor wafer and the defect characteristics.", *Gleason et al.*, 1:45-50.

Regarding **claim 15**, claim 5 recites identical features as in claim 15. Thus, arguments equivalent to those presented above for claim 5 is equally applicable to claim 15.

[11] **Claims 3** and **13** are rejected under 35 U.S.C. 103(a) as being unpatentable over the combination between *Takane et al.* "first embodiment" in further view of *Takane et al.* "eighth embodiment".

Regarding **claim 3**, while *Takane et al.* "first embodiment" further discloses

wherein the image selector selects a plurality of the images, the determined in-focus states of the selected images matching pre-selected in-focus states (refer to references/arguments in claim 1);

the pattern measuring apparatus further comprises an image processor to perform alignment processing among the selected images and superimpose in a single coordinate system the edge points of the pattern within the selected images (refer to references/arguments cited in claim 1); and

the measurer measures the pattern on the basis of position coordinates of the edge points that have been superposed in the single coordinate system (refer to references/arguments cited in claim 1), however *Takane et al.* "first embodiment" does not teach the pattern measuring apparatus further comprising an image processor which performs alignment processing among the selected plurality of images.

Takane et al. "eighth embodiment" teaches a pattern measuring apparatus further comprising an image processor which performs alignment processing among images ("An optical microscope image acquired by magnifying the alignment pattern a few hundreds times is compared with an alignment pattern reference image registered in the memory unit 3015, and

correct the stage position coordinates to exactly align the visual field of the optical microscope image with that of the reference image." at 16:50).

It would have been obvious to one of ordinary skill in the art at the time the invention was made for the pattern measuring apparatus according to *Takane et al.* "first embodiment" to teach an image processor which performs alignment processing among pattern images as taught by *Takane et al.* "eighth embodiment" "...to correct the position coordinate system on the X-Y stage and the pattern position coordinate system in the wafer.", *Takane et al.* "eighth embodiment" at 16:48.

Regarding **claim 13**, claim 3 recites identical features as in claim 13. Thus, arguments equivalent to those presented above for claim 3 is equally applicable to claim 13.

[12] **Claims 6** and **16** are rejected under 35 U.S.C. 103(a) as being unpatentable over the combination between *Takane et al.* "first embodiment" in further view of *Takane et al.* "fourth embodiment".

Regarding **claim 6**, while the *Takane et al.* "first embodiment" further discloses

the calculator classifies the detected edge points into edge point group for each of the edges, and calculates a standardized correlation value for each of the edge point groups that have been classified, (The groups (referred to as "sections" by *Takane et al.*) are those shown at fig. 4 of the first embodiment of the invention (showing two in-focus groups). Refer to the references cited in claim 1. The calculator classifies every pixel of the image with the maximum function, thus the calculator naturally classifies edge points that have been detected into edge point groups for each of the edge lines, and further calculates a characteristic quantity for each of the edge point groups that have been classified.); and

the determinator determines the in-focus state of the image for each of the edge point groups that have been classified (Refer to the references cited in claim 1. The determinator determines every pixel of the image with the full conditional maximum function, thus the determinator naturally determines the in-focus state of the pattern image for each of said edge point groups that have been classified.), the combination does not teach wherein the pattern has a plurality of edge lines (*Takane et al.* "first embodiment", fig. 4 discloses a "hole" of the "first embodiment" which only has one edge line-the circle itself).

Takane et al. "fourth embodiment" teaches a pattern measuring apparatus further comprising wherein the pattern has a plurality of edges ("fig. 9 shows indication examples for displaying composite images on a real time basis according to the present invention." at 9:60. The pattern shown at fig. 9 are holes, each with two edge lines and hence a plurality of edge lines.)

It would have been obvious to one of ordinary skill in the art at the time the invention was made for the pattern measuring apparatus according to *Takane et al.* "first embodiment" to teach the pattern having a plurality of edges as taught by *Takane et al.* "fourth embodiment", to differentiate a plurality of sections of the pattern to be further processed by the disclosed invention.

Regarding **claim 16**, claim 6 recites identical features as in claim 16. Thus, arguments equivalent to those presented above for claim 6 is equally applicable to claim 16.

[13] **Claims 7, 10,** and **18-26** are rejected under 35 U.S.C. 103(a) as being unpatentable over the combination between *Takane et al.* "first embodiment" in further view of *Takane et al.* "fifth embodiment".

Regarding **claim 7**, while *Takane et al.* “first embodiment” discloses all elements of claim 1 that recites identical features as in claim 7, *Takane et al.* “first embodiment” does not disclose a measurer to, for each of the images, process the image to measure the pattern if the determinator has determined that the in-focus state of the image matches a preselected in-focus state; and a focal-position controller to, for each of the images, generate and output control signals to change the focal position of the optical system of the external imaging device, if the determinator has determined that the in-focus state of the image does not match the preselected in-focus state.

Takane et al. “fifth embodiment” teaches a measurer (apparatus element responsible for fig. 40 algorithm) to, for each of the images, process the image to measure the pattern if the determinator has determined that the in-focus state of the image matches a preselected in-focus state (the preselected in-focus state being the "specified number of images completed"); and

a focal-position controller (apparatus element responsible for fig. 40 algorithm)to, for each of the images, generate and output control signals to change the focal position of the optical system of the external imaging device (“change focus value by focal change amount” at fig. 40, if the determinator has determined that the in-focus state of the image does not match the preselected in-focus state (if the specified number of images completed is not met, the focus value by focal change amount is changed).

It would have been obvious to one of ordinary skill at the time the invention was made for the apparatus of *Takane et al.* “first embodiment” to include a measurer to, for each of the images, process the image to measure the pattern if the determinator has determined that the in-focus state of the image matches a preselected in-focus state; and a focal-position controller to,

for each of the images, generate and output control signals to change the focal position of the optical system of the external imaging device, if the determinator has determined that the in-focus state of the image does not match the preselected in-focus state as taught by *Takane et al.* "fifth embodiment" to "determine[[s]] an optimal focus change amount using the calculation results and the number of images specified. In another setting screen, the operator can further specify the under-focus direction, the over-focus direction, or both directions with the current value at the center for focus control when capturing images. The control CPU sequentially captures the specified number of images while performing focus control according to the specified control conditions. These images are stored in an image memory, and used for the later processes (image transfer, image composition, etc.)", *Takane et al.* at 29:30-48.

Regarding **claim 10**, *Takane et al.* "first embodiment" discloses wherein the standardized correlation value (e.g., "max(Sg1, Sg2, Sg3, Sg4, Sg5) = Sg2" at fig. 11, emphasis added) is calculated by using a plurality of sets of predetermined edge reference data (*see* above matrices).

Regarding **claim 18**, claim 7 recites identical features as in claim 18. Thus, arguments equivalent to those presented above for claim 7 is equally applicable to claim 18.

Regarding **claim 19**, while *Takane et al.* "first embodiment" discloses all elements of claim 11 that recites identical features as in claim 19, *Takane et al.* "first embodiment" does not disclose a focal position of the optical system being adjustable with respect to the pattern by an integer multiple of a predetermined step width from a predetermined initial value.

Takane et al. "fifth embodiment" teaches a focal position of the optical system being adjustable with respect to the pattern by an integer multiple of a predetermined step width

("desired pattern width" at 13:59-64) from a predetermined initial value ("change focus value by focal change amount" at fig. 40, emphasis added).

It would have been obvious to one of ordinary skill at the time the invention was made for the apparatus of *Takane et al.* "first embodiment" to include a focal position of the optical system being adjustable with respect to the pattern by an integer multiple of a predetermined step width from a predetermined initial value as taught by *Takane et al.* "fifth embodiment" to "determine[[s]] an optimal focus change amount using the calculation results and the number of images specified. In another setting screen, the operator can further specify the under-focus direction, the over-focus direction, or both directions with the current value at the center for focus control when capturing images. The control CPU sequentially captures the specified number of images while performing focus control according to the specified control conditions. These images are stored in an image memory, and used for the later processes (image transfer, image composition, etc.)", *Takane et al.* at 29:30-48.

Regarding **claim 20**, claim 19 recites identical features as in claim 20. Thus, arguments equivalent to those presented above for claim 19 is equally applicable to claim 20.

Regarding **claim 21**, claim 7 recites identical features as in claim 17 including an edge model producing unit (apparatus unit responsible for fig. 11) to produce a pattern edge model (fig. 11, item 1102) in a form of an array of cells (e.g., one cell being "Sg1" at item 1102), the array having a relative intensity value (item 1102 have relative intensity values from the Sobel filter) stored therein and a position of an edge point (the pixel locations are stored in item 1102) of the pattern edge model (fig. 11, item 1102) being assigned thereto.

Thus, arguments equivalent to those presented above for claim 7 is equally applicable to claim 21.

Regarding **claim 22**, claim 21 recites identical features as in claim 22. Thus, arguments equivalent to those presented above for claim 21 is equally applicable to claim 22.

Regarding **claim 23**, claim 11 recites identical features as in claim 23 including an edge model producing unit (apparatus unit responsible for fig. 11) to produce a pattern edge model (fig. 11, item 1102) in a form of an array of cells (e.g., one cell being "Sg1" at item 1102), the array having a relative intensity value (item 1102 have relative intensity values from the Sobel filter) stored therein and a position of an edge point (the pixel locations are stored in item 1102) of the pattern edge model (fig. 11, item 1102) being assigned thereto.

Thus, arguments equivalent to those presented above for claim 11 is equally applicable to claim 23.

Regarding **claim 22**, claim 21 recites identical features as in claim 22. Thus, arguments equivalent to those presented above for claim 21 is equally applicable to claim 22.

Regarding **claim 24**, claims 7 and 11 recite identical features as in claim 24. Thus, arguments equivalent to those presented above for claims 7 and 11 are equally applicable to claim 24.

Regarding **claim 25**, claims 7 and 11 recite identical features as in claim 25. Thus, arguments equivalent to those presented above for claims 7 and 11 are equally applicable to claim 25.

Regarding **claim 26**, claims 7 and 11 recite identical features as in claim 26. Thus, arguments equivalent to those presented above for claims 7 and 11 are equally applicable to claim 26.

[14] **Claim 8** is rejected under 35 U.S.C. 103(a) as being unpatentable over the combination between *Takane et al.* "first embodiment" in further view of *Takane et al.* "fifth embodiment" and *Gleason et al.*

Regarding **claim 8**, claim 5 recites identical features as in claim 8. Thus, arguments equivalent to those presented above for claim 5 is equally applicable to claim 8.

[15] **Claim 9** is rejected under 35 U.S.C. 103(a) as being unpatentable over the combination between *Takane et al.* "first embodiment" in further view of *Takane et al.* "fifth embodiment" and *Takane et al.* "fourth embodiment"

Regarding **claim 9**, claim 6 recites identical features as in claim 9. Thus, arguments equivalent to those presented above for claim 6 is equally applicable to claim 9.

Conclusion

[16] The prior art made of record and not relied upon is considered pertinent to applicant's disclosure: Sobel operator, Wikipedia, http://en.wikipedia.org/wiki/Sobel_operator

[17] Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See M.P.E.P. § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

[18] Any inquiry concerning this communication or earlier communications from the examiner should be directed to DAVID P. RASHID whose telephone number is (571)270-1578. The examiner can normally be reached Monday - Friday 7:30 - 17:00 ET.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Vikkram Bali can be reached on (571) 272-74155. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications

may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/David P. Rashid/
Examiner, Art Unit 2624

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